

Automatic Power Control of A/V Devices using Sleeping Content Streams

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*This summarizes a report on Use Cases and Device Behavior that can be found at:
<http://nordman.lbl.gov/avcontrol.html>*

A key element of energy efficiency of audio/video devices is to ensure that they are fully on as little time as possible when they are not needed. To accomplish this, powering A/V devices down **and up** needs to be automatic and consistent with user needs and expectations. As content streams become more numerous, potentially more complex, and involve multiple transport technologies, a new mechanism may be needed to ensure that this works, and works well. Note that this discussion *only* addresses transport within a local network — not involving service provider networks or the wider Internet.

The scheme is built on several design principles, including: having no central controlling device, informing rather than commanding devices, placing content streams at the core of the architecture, building on successful technologies, and using the sleep metaphor. This separation of management of functionality from management of power state appears to be simpler and more robust than potential alternatives.

An A/V stream today either exists and is active (pausing is considered to be part of active), or it is terminated and does not exist at all. The proposed idea of a sleeping stream is one that is not active but whose existence — the devices and settings involved — is retained in the network. Putting aside implementation details, when a stream awakens, then each involved device will also wake up (unless it is off, or unless it was already on) and the stream will recommence delivering content. When a stream is put to sleep, devices that are part of it often go to sleep, but they may be engaged in unrelated activity and so stay awake. Streams would only be created while each involved device is active.

The detailed report addresses issues such as transition states, error conditions, timing considerations, and legacy devices. It covers use cases with one, two, and three devices (more than three does not introduce any new considerations). From many use cases, a set of behaviors are extracted that are implemented by sources, sinks, intermediate devices, and streams; the behaviors are specific to the state of each entity (on, sleep, or off).

If adopted by industry, the following would need to occur:

- Creation of a 'meta-standard' that defines the semantics of sleeping content streams.
- Addition of features to existing standards (particularly HDMI and IP-based technologies) to enable persistent content streams, implementing the meta-standard.
- Implementation of the sleeping stream functionality into products, including dealing with legacy products.
- User education to understand the new scheme.

Comments on the concept and details are most welcome.